EASTERN GREAT BASIN
2003 WATER YEAR IN REVIEW

A LOOK BACK AT LAST YEAR...

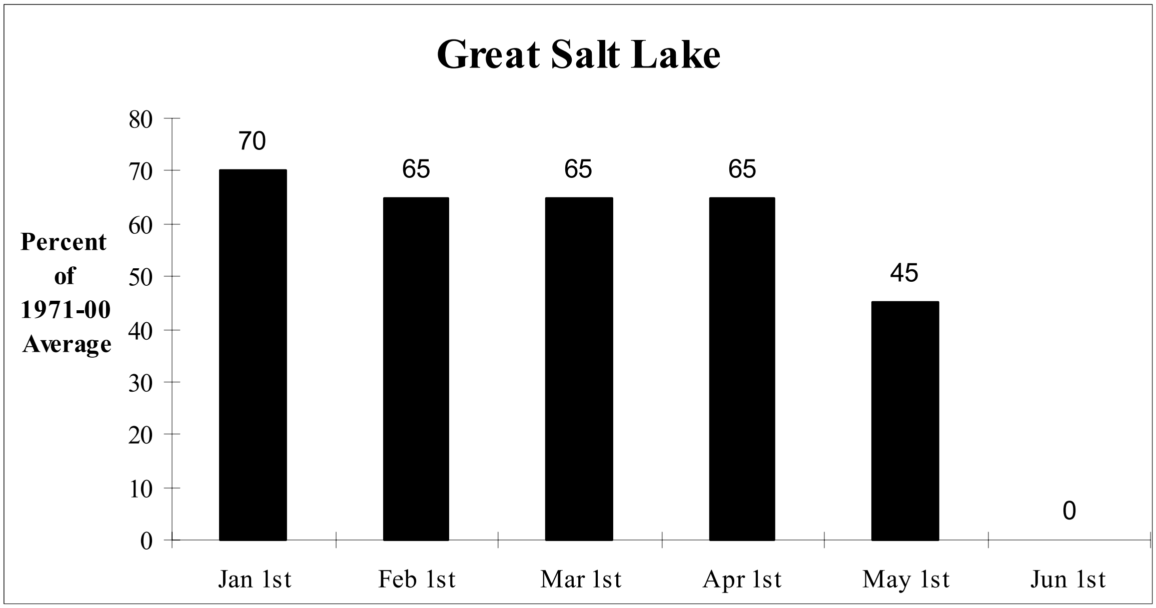
This is a summary of the 2003 eastern Great Basin water supply forecasts and subsequent observed runoff volumes where available. Volume forecasts and observations are for the April-July period (except where indicated) and are expressed in 1000's of acre-feet. Averages are for the 1971-2000 period.

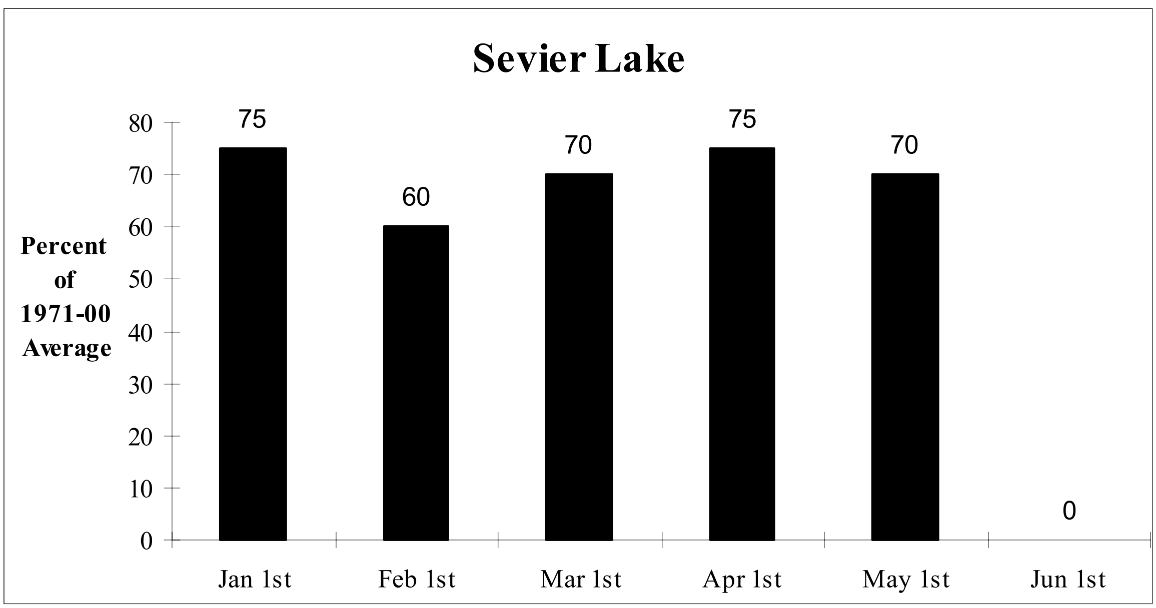
This product is designed to assist individuals and agencies with water supply concerns in summarizing last year's (2003) spring runoff and in planning for the coming year.

Please not that all observed values are provisional. Final values may differ from those listed herein. Many adjustments for diversions have been estimated from historical averages. In extreme years these *average* estimates may result in large discrepancies between provisional and final values. In addition, during hot, dry summers both unknown/unmeasured diversions and environmental losses due to evaporation and channel transmission tend to increase. Total abstractions engineered and environmentally induced, may cause natural flow calculations to yield a number less than zero, particularly at locations well downstream. At such locations, comparisons between forecast and observed flows become more difficult and less meaningful.

Included in this review is expanded treatment of the confidence intervals associated with forecasts. The reasonable maximum and minimum values, which form the boundaries of the confidence interval, are statistical measures reflecting both the accuracy of the regression equation used to produce the forecast and the natural variability of streamflow volume. As the forecast season progresses, confidence intervals should narrow as meteorological conditions become known. The most probable forecast, a 50% exceedance probability, is most often cited. However, the reasonable minimum, a 10% exceedance probability, and maximum, a 90% exceedance probability, are important indicators of the "confidence" of the most probable forecast. Under normal meteorological circumstances, observed flows will fall within the confidence interval 80% of the time; flows may occur outside interval boundaries in years exhibiting uncharacteristic conditions.

SPRING 2003 SNOWPACK REVIEW
Snow Water Equivalent





2003 Forecast Summary for: GREAT SALT LAKE BASIN

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	AVG%
BEAR	UTAH-WYOMING STATE LINE, NR	78	70	70	70	62	73	83	72
	WOODRUFF NARROWS RES	62	53	53	53	32	55	64	47
	RANDOLPH, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	MONTPELIER, NR, STEW, DAM, BLO	122	93	96	106	30	44	N/A	N/A
BIG CK	RANDOLPH, NR	2.8	2.1	2.1	2	1.3	0.4	N/A	N/A
SMITHS FORK	BORDER, NR	69	58	60	63	45	53	N/A	N/A
THOMAS FORK	WYOMING-IDAHO STATE LINE, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MONTPELIER CK	MONTPELIER, NR IRRIGATORS WEIR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CUB	PRESTON, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LOGAN	LOGAN, NR, STATE DAM, ABV	79	67	69	69	58	65	69	55
BLACKSMITH FORK	HYRUM, NR, UP&L DAM, ABV	31	25	26	20	18.4	22	22	46
SMITH AND MOREHOUSE CK	OAKLEY, NR	24	22	20	20	18	21	N/A	N/A
WEBER	OAKLEY, NR	83	77	70	70	61	73	72	59
	ROCKPORT RES WANSHIP, NR	80	72	72	72	62	67	73	54
	COALVILLE, NR	81	72	72	72	62	67	N/A	N/A
	ECHO RES, ECHO, AT	112	91	86	97	80	85	N/A	N/A
	GATEWAY	215	166	140	146	113	113	N/A	N/A
CHALK CK	COALVILLE	30	17	16	23	15	17	N/A	N/A
LOST CK	LOST CK RES, CROYDON, NR	11	5.5	5.3	5.3	4.8	4.2	4.8	27
EAST CANYON CK	EAST CANYON RES, MORGAN, NR	19	14.5	10.7	10.7	10.7	8.5	N/A	N/A
SF OGDEN	HUNTSVILLE, NR	44	31	27	23	19	17.4	23	36
OGDEN	PINEVIEW, RES, OGDEN, NR	86	60	53	44	37	33	36	27
WHEELER CK	HUNTSVILLE, NR	4.8	3.7	3.4	3.4	1.8	1.9	N/A	N/A
PAYSON CK	PAYSON, NR, DIV, ABV	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPANISH FORK	THISTLE, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	CASTILLA	47	36	35	34	26	30	28	36
HOBBLE CK	SPRINGVILLE, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PROVO	WOODLAND, NR	73	55	53	52	45	65	73	71
	HAILSTONE, NR	71	52	49	48	41	63	81	74
	DEER CK RES	88	70	65	63	55	81	61	48
AMERICAN FORK	AMERICAN FORK, NR	19	14	12	11	9.5	10	N/A	N/A
JORDAN	UTAH LAKE, PROVO, NR	210	155	145	143	117	143	150	46

Provisional Flows in 1000 Acre - Feet

2003 Forecast Summary for: GREAT SALT LAKE BASIN

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	%AVG
LITTLE COTTONWOOD CK	SALT LAKE CITY, NR	25	23	22	20	20	18	N/A	N/A
BIG COTTONWOOD CK	SALT LAKE CITY, NR	21	18	18	18	18	15	N/A	N/A
CITY CK	SALT LAKE CITY, NR	4.4	3.6	3.2	3.2	3.2	1.3	N/A	N/A
EMIGRATION CK	SALT LAKE CITY, NR	2	1.5	1.4	1.3	1.3	0.7	N/A	N/A
MILL CK	SALT LAKE CITY, NR	3.3	2.8	2.5	2.4	2.4	1.2	N/A	N/A
DELL FK	LITTLE DELL RES, SLC, NR	3.4	2.9	2.7	2.4	2	1	N/A	N/A
PARLEYS CK	SALT LAKE CITY, NR	8.8	7.7	6.1	5.8	5.7	1.5	N/A	N/A
VERNON CK	VERNON, NR	0.8	0.6	0.6	0.5	0.3	0.5	N/A	N/A
S WILLOW CK	GRANTSVILLE, NR	2.4	2	1.6	1.5	1.5	1.4	N/A	N/A
SETTLEMENT CK	TOOELE, NR	1	0.8	0.8	0.8	0.6	0.5	N/A	N/A

Provisional Flows in 1000 Acre-Feet

2003 Forecast Summary for: SEVIER LAKE BASIN

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	%AVG
SEVIER	HATCH	38	28	30	29	29	25	23	42
	CIRCLEVILLE, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	KINGSTON, NR	60	44	46	45	45	38	N/A	N/A
	PIUTE RES, MARYSVALE, NR	81	58	60	58	58	48	N/A	N/A
	VERMILLION DAM	114	83	86	83	83	70	N/A	N/A
	SIGURD, NR	121	87	90	86	86	73	N/A	N/A
	GUNNISON, NR SAN PITCH, BLO	176	126	130	123	123	110	132	47
ANTIMONY CK	ANTIMONY, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EF SEVIER	KINGSTON, NR	26	19	20	21	20	17	N/A	N/A
CLEAR CK	SEVIER, NR, DIV, ABV	15	11	12	14	12	11	10.9	50
SALINA CK	SALINA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EPHRAIM CREEK	EPHRAIM NR, UT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PLEASANT CK	MT PLEASANT, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CHICKEN CK	LEVAN, NR	3.3	1.9	1.6	1.5	0.9	0.9	N/A	N/A
OAK CK	OAK CITY, NR, LITTLE CK, ABV	0.8	0.7	0.7	0.8	0.6	0.9	N/A	N/A
BEAVER	BEAVER, NR	17.5	15	16	16	14	17.1	16.7	64
	MINERSVILLE RES, MINERSVILLE, NR	7.7	6.5	7.8	8.5	7.5	8.8	N/A	N/A
COAL CK	CEDAR CITY, NR	11.5	8.5	9.5	8.4	8.4	8.9	9.6	50

Provisional Flows in 1000 Acre-Feet

What makes a **GOOD** water supply forecast?... a **BAD** forecast?

Is it as simple as which forecast comes closest to the actual observation? Probably not, as a number of factors necessitate a more sophisticated evaluation of forecast quality be undertaken. Such an evaluation would not be trivial and is beyond the time and space constraints of this note. Nonetheless, with apologies for simplification and omission, some of the factors include:

subsequent meteorological conditions - the implicit assumption behind any forecast is that the meteorological conditions during the remainder of the snow accumulation and melt season will be "normal." While it may be difficult to adequately define what "normal" is, it is easier to discern conditions that are extreme or "not normal." As such, a given forecast at a given time may have been the best forecast possible in light of known conditions, although ultimately turning out to be 20% too low; it just so happened that the ensuing meteorological conditions were unusually wet. Just as a good forecast may be made to look bad by abnormal conditions in the future, the reverse situation is also possible.

natural variability of site's streamflow - simply put, some rivers are much more difficult to forecast then others. Historically, such river flows may vary over a wide range and be quite sensitive to changing conditions, particularly in environs where the number of precipitation events are few. On the other hand, some river flows may be relatively constant with the effects of diverse conditions dampened. Oftentimes scale is a good indicator of the variability of flow at a given site. A 20% error on a small stream in Arizona may be more laudable than a 10% error on Lake Powell inflow.

character of the year - by definition, extreme events are rare and forecasting such events become more difficult. Because the number of past extreme events is small, less is known about the distribution and variability than in situations with "near-normal" populations. Even if it was possible to remove uncertainty about future meteorological conditions, there would still be more error associated with forecasting extreme events.

During the extreme conditions there is a demand that the forecaster make a more powerful (and potentially more valuable) statement: in effect, that "even normal conditions from here on out will not be enough to compensate for current abnormal snowpack and soil states." It is during such events that consideration of information other than just the most probable forecast become especially important. Probability statements that convey the likelihood of exceeding a certain level (such as the reasonable maximum and minimum forecasts) help to underscore the uncertainty associated with the forecast.

So why do it? Although it may not be a simple matter to grade a forecast, it is still useful for users and forecasters alike to review the previous year's forecasts and adjusted observations (provisional as they may be with estimated diversions) so as to act on obvious problems and to gain perspective for the coming forecast season.

Additional Information

Water supply forecasts take into consideration present hydrometeorological conditions and use average basin temperatures and precipitation for the forecast period. As the forecast season progresses, a greater portion of the future hydrologic and meteorological uncertainty becomes known and monthly forecasts become more accurate. Volume forecasts represent adjusted flows; that is, observed flows with upstream water use taken into account. At best, adjusted flows will closely approximate natural or unimpaired flows. However, not all upstream diversions or impoundments are measured, quantifiable or predictable.

The Water Supply Outlook is issued monthly January through May by the Colorado Basin River Forecast Center, National Weather Service. It represents a coordinated effort between the National Weather Service, soil Conservation Service, Bureau of Reclamation, U.S. Geological Survey and local water district managers.

DEFINITIONS:

Acre-Foot:
The volume equal to one acre covered one foot deep (43,560 cubic feet).

Average:
The arithmetic mean. The sum of the values divided by the number of values.

Categories:

Much above Average	Above Average	Near Average	Below Average	Much below Average
Greater than 30%	111 - 130%	90 - 100%	70 - 89%	Less than 70%F

Forecast Period: The period from April 1 to July 31.

Most Probable Forecast:
Given the current hydrometeorological conditions to date, this is the best estimate of what the runoff volume will be this season.

Reasonable Maximum Forecast:
Given the current hydrometeorological conditions, the seasonal runoff that has a ten percent (10%) chance of being exceeded.

Reasonable Minimum Forecast:
Given the current hydrometeorological conditions, the seasonal runoff that has a ninety percent (90%) chance of being exceeded.

Water Year: The period from October 1 through September 30.
NOTE: Data used in this report are provisional and are subject to revision.
For more information, or to be included on the mailing list, please contact:
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